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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/756,971	01/09/2001	Salman Akram	MI22-1572	7766

21567 7590 09/05/2003

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EXAMINER

ZARNEKE, DAVID A

ART UNIT PAPER NUMBER

2827

DATE MAILED: 09/05/2003


Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/756,971

Applicant(s)

AKRAM, SALMAN 

Examiner

David A. Zarneke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 63-79 is/are allowed.
- 6) ☒ Claim(s) 42-57 is/are rejected.
- 7) ☒ Claim(s) 58-62 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

The examiner notes the terminal disclaimer filed 7/3/03 and, pending official PTO approval, removes the double patenting rejections of claims 42-56 and 63-74. Note that the process of finally approving the terminal disclaimer will not be undertaken until all other outstanding issues have been resolved and the application is in condition for allowance.

Allowable Subject Matter

Claims 58-62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 63-74 stand allowed over the prior art, pending final PTO approval of the terminal disclaimer filed 7/3/03.

Claims 75-79 stand allowed over the prior art, as noted in previous office actions.

Response to Arguments

Applicant's arguments, filed 7/3/03, with respect to the rejection of claims 42 and 43 under 35 USC §102(e), have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection, detailed below, is made in view of applicant's amendment

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including the limitation of forming a thermally conductive material over at least a portion of the die, the material comprising a thermal conductivity greater than that of elemental copper.

The examiner asserts that Chen teaches materials for the thermally conductive material that fit the requirement that the material comprising a thermal conductivity greater than that of elemental copper. The details of this rejection can be found stated in the rejections below.

Applicant's argument with respect to claim 45, filed 7/3/03, has been fully considered but they are not persuasive.

Applicant's inclusion of the limitation of the metal foil having a thickness of less than or equal to about 500 microns, barring a showing of unexpected results, is unpatentable as discussed below.

Applicant's argument, filed 7/3/03, regarding the physical contact of the foil to the die recited in claim 52 has been fully considered but it is not persuasive, and the same argument regarding claim 57 has been fully considered and is persuasive.

Therefore, the rejection of claim 52 stands as written in the previous office action and in consideration of the response presented below, and the rejection of claims 57 has been withdrawn. However, upon further consideration, a new ground of rejection for claims 57 is made.

In claims 52 and 57, it is argued that the Wang fails to teach **physical** contact of the foil and the die sidewalls.

The examiner asserts that the specification (page 12, 6-22) teaches the **physical** contact to be achieved through the use of a conductive epoxy provided between the foil and the die sidewalls. Therefore, the applicant's definition of physical contact with the sidewalls of the die has been met.

The rejection of these claims, in view of the arguments discussed above, and the rejection of all other claims, which stand as written in the previous office action, are detailed below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

These rejections are in response to the above response to arguments.

Claims 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view of Chen et al., US Patent 6,215,180.

Chan, relied upon as taught in the previous office actions, fails to teach forming a thermally conductive material over at least a portion of the die, the material comprising a thermal conductivity greater than that of elemental copper.

Chen (figure 5), relied upon as taught in previous office actions, further teaches a thermal conductive material (59) over at least a portion of the die (51), the material comprising Al, Cu, Fe, Ni or their alloys (4, 39+). The specification of the present invention (page 9, lines 16-8) cites copper, aluminum and silver-filled epoxy as

materials suitable for use as the thermal conductive material. Therefore, Chen's use of aluminum and copper could meet the requirements of the present claim 42.

Claims 45, 49-51, 53, 55 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view of Chen et al., US Patent 6,215,180.

Chan and Chen, both relied upon as taught in the previous office action, fail to teach the metal foil having a thickness of less than or equal to about 500 microns.

It would have been obvious to one ordinary skill in the art at the time of the invention to optimize the thickness of the metal foil (MPEP 2144.05(b)). One of ordinary skill would perform routine experiments to find the optimal metal foil thickness to perform its function.

Claims 52 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view of Chen et al., US Patent 6,215,180, as applied to claim 45 above, and further in view of Wang et al., US Patent 6,226,140.

As discussed above, Wang teaches the foil as being in physical contact with the die in keeping with the present application's definition of physical contact (12, 9-17).

Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakashima et al., US Patent 5,661,086, in view of Chen et al., US Patent 6,215,180, and Wang et al., US Patent 6,226,140.

Nakashima and Chen, both relied upon as taught in the previous office action, fail to teach the die as comprising sidewalls extending from the insulative substrate and the

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metal foil adhered to the second surface thereof physically contacting at least a portion of at least one sidewall.

Wang, relied upon as taught in the previous office action, teaches the foil in physical contact, as defined by the specification of the present application (p12, 9-17), with the sidewalls of the die.

The following rejections stand as written in the previous office action.

Claims 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view of Chen et al., US Patent 6,215,180, as applied to claim 45 above, and further in view of Tummala et al., Microelectronics Packaging Handbook; Semiconductor Packaging - Part 11 2nd Edition pages 898-901.

Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al., US Patent 5,998,860, in view of Chen et al., US Patent 6,215,180, as applied to claim 45 above, and further in view of Tummala et al., Microelectronics Packaging Handbook Subsystem Packaging – Part III, 2nd Edition, pages 223-234.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

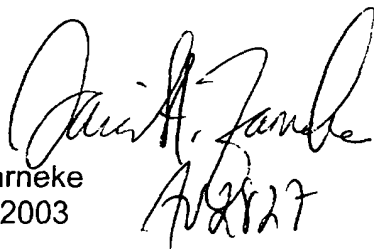
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (703)-305-3926. The examiner can normally be reached on M-F 10AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703)-308-1233. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-305-3900.

David A. Zarneke
August 31, 2003

A handwritten signature in cursive script, appearing to read "David A. Zarneke", is written over the typed name. Below the signature, the number "2827" is handwritten.